MSS systems, although now that Leosat is espousing spread spectrum, there are no such additional applicants before the Commission (other than VITA, and the capability of VITA and ORBCOMM to co-exist has been demonstrated).[19/]

ORBCOMM has indicated that several commercial LEO systems could be accommodated within the frequency bands proposed for allocation. A specific number cannot be stated at this point because the technical details of systems with which coordination would need to be effected are presently unknown. However, it is possible for at least three such systems to be accommodated if they maintain the identical parameters selected by ORBCOMM.

CONCLUSION

The record to date clearly establishes a need for the LEO satellite services, and a capability to meet those needs in a cost-effective and rapid manner. The only significant remaining area of contention is the relative merits and capabilities of FDMA versus spread spectrum operation. ORBCOMM believes that only FDMA will allow for a workable, viable service, and therefore requests that the Commission reject the suggestions of

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19/ ORBCOMM makes one further observation concerning the technical issues raised by Starsys' comments in this proceeding. Existing use of the 137.0-138.0 MHz band is via FDMA techniques. Were the 300 kHz, for which MSS is to be secondary to METSAT, to be fully utilized in a manner similar to ORBCOMM's proposal, the METSAT services would cause harmful interference to Starsys' service. This explains why Starsys has offered its own newly-created definition of a secondary allocation which requires "[existing] operations [to] remain consistent with the power levels and sensitivities of current systems."

POSSIBLE STARSYS EARTH STATION LOCATIONS

EAST

36°30'N 81°30'W

36° N 80° W

38° N 78°30'W

WEST

35° N 117° W

37°30'N 121°30'W

LEOAC 26

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	ET Docket No. 91-280
	)	
Amendment of Section 2.106 of the	)	RM-7344
Commission's Rules to Allocate	)	RM-7399
Spectrum to the Fixed-Satellite	)	RM-7612
Service and the Mobile-Satellite	)	
Service for Low-Earth Orbit	)	
Satellites	)	

To: The Commission

COMMENTS OF STARSYS GLOBAL POSITIONING, INC.

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Stephen D. Baruch

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Washington, D.C. 20006-1809

Attorneys for STARSYS Global Positioning, Inc.

December 24, 1991

disadvantages of requiring spread spectrum or FDMA modulation for this service, in order that it could establish a competitive LEO service in the spectrum proposed. Id.

STARSYS applauds the Commission's commitment to the establishment of a competitive LEO service, and reiterates that a multiple-entry approach is the only approach that is consistent with the Commission's policies and the public and national interests. As shown below, spectrum sharing by LEO MSS systems is more efficient with CDMA spread spectrum modulation than it is with FDMA modulation. Spread spectrum modulation should thus be required.

The practicality of spread-spectrum terrestrial terminal technology has been demonstrated in commercial systems. The Geostar and Omnitracs systems have demonstrated the technical practicality of operating spread-spectrum terminals in mobile commercial environments. Commercial quality GPS receivers are in widespread use. It cannot be claimed that FDMA is more desirable because the terminal technology is more mature; in fact FDMA modulation is so "mature" that it has been surpassed in efficiency by newer technologies.

In Section F above, STARSYS showed that up to seven similar spread-spectrum systems could be licensed to operate in the same frequency bands. Inasmuch as the final issue in a comparison of FDMA and spread-spectrum modulation is the relative efficiency in use of the frequency allocation, spread spectrum modulation must prevail in a head-to-head comparison.

§ 25.401. Space Station Application Requirements for the Non-Voice Non-Geostationary Satellite Service (< 1 GHz).

(a) Each application for a space station license in the Non-Voice Non-Geostationary Satellite Service (< 1 GHz) shall describe in detail the proposed Non-Voice Non-Geostationary Satellite system, setting forth all pertinent technical and operational aspects of the system, and the technical, legal, and financial qualifications of the applicant. In particular, each application shall include the information specified in Section 25.114, except that in lieu of the information concerning orbital locations requested in Section 25.114(c)(6), the applicant shall specify the number, altitude(s), argument(s) of perigee, service arc(s), right ascension of ascending node(s), and orbital plane(s) of the space stations that will comprise its system. Applicants must also file information demonstrating compliance with all requirements of this section, and demonstrating that they will not cause harmful interference to any authorized or licensed Non-Voice Non-Geostationary Satellite Service (< 1 GHz) system.

(b) Applicants for commercial systems in the Non-Voice Non-Geostationary Satellite Service (< 1 GHz) must demonstrate in their applications that within six years of the grant of a nonconditional construction permit, they will be able to provide service to the United States, with service being available at least 75% of the time. For purposes of measuring compliance with this provision, service is deemed to be available if there is the potential for a user transceiver to transmit and/or receive a message directly to or from a space station operated as part of a commercial system.

(c) Applicants for Non-Voice Non-Geostationary Satellite Service (< 1 GHz) systems must identify the power flux density produced at the Earth's surface by each space station of their systems in the frequency bands 137-138 MHz and 400.15-401 MHz. In addition, applicants must identify the measures they would employ to protect the radio astronomy service in the 150.05-153 MHz and 406.1-410 MHz bands from harmful interference from unwanted emissions.

§ 25.407. Frequency Assignment Policies.

Each Non-Voice Non-Geostationary Satellite Service (< 1 GHz) licensee will be assigned frequencies in the 137-138 MHz, 148-150.05 MHz, ~~[~~399.9-400.05 MHz,~~]~~ and/or 400.15-401 MHz bands, subject to its ability to demonstrate compliance with all of the requirements of this subpart, including the demonstration that it will not cause harmful interference to any authorized or licensed Non-Voice Non-Geostationary Satellite Service (< 1 GHz) system, and the demonstration that it will operate compatibly with other authorized users in the assigned frequency bands by complying with the operating conditions specified for Non-Voice Non-Geostationary Satellite Service (< 1 GHz) systems in Section 25.408.

NOTE: Until January 1, 1997, licensees in the Non-Voice Non-Geostationary Satellite Service (< 1 GHz) may use the allocations in the 149.9-150.05 MHz and 399.9-400.05 MHz bands on a secondary basis only.

LEOAC-28

Introduction:

Although outside the purview of this committee, the following errors in the existing Part 25 rules should be noted:

Rule section 25.202(f)(4) should be corrected to reference paragraphs "(f)"... rather than "(g)"...

Rule section 25.203 references to "earth station" should be changed to "fixed earth station", or "base earth station", since "earth station" is defined as including mobiles.

Also, since it is outside the purview of this advisory committee to consider changes to FCC rules of services other than LEO, any changes to frequency tolerances, or emission limitations in subpart C "technical standards", must not apply to any service other than LEO. Therefore, the following recommended rules for LEO service should be applicable only to LEO.

Finally, it should be recognized that, in a "bent pipe" satellite, without doppler compensation, the output frequency, as received by a receiver at a fixed point on the Earth's surface, could removed from the assigned frequency by as far as the sum of the up link tolerance error plus the up link doppler shift plus the satellite local oscillator tolerance, plus the down link doppler error. For an up link frequency of 148 MHz, with tolerance of 0.001%, a satellite tolerance of 0.002%, and a doppler shift of 2800 Hz @ 137 MHZ, and 3025 Hz @ 148 MHz, the frequency error seen at a fixed receiver could be as much as 10.045 kHz. While compensation techniques could be applied to reduce this error, the FCC rules should assure that the applicants for LEO systems take account of the possible worst-case scenario.

Recommendation:

Insert new rule 25.202(g), with text as follows:

(a) Applicants in the non-geostationary, non-voice service shall show that their down link frequencies are sufficiently offset from the lower and upper down link band edges to prevent signals from appearing to be outside the downlink band, or to appear to exceed the emission limitations of paragraphs (f) (1), (2), and (3) of this section, as measured at a fixed point on the Earth's surface in the plane of the satellite's orbit, considering the worst-case frequency tolerance of all frequency determining components, and maximum positive and negative doppler shift of both the up link and down link signals.

(b) Applicants in the non-geostationary, non-voice service shall show that no signal received by the satellite from sources outside of their system shall cause an output signal to be generated that is not in conformance with paragraphs (f) and (g) of this section.

LEOAC-29

PUBLIC NOTICE

FEDERAL COMMUNICATIONS COMMISSION
1919 M STREET N.W.
WASHINGTON, D.C. 20554

24411

News media information 202/632-5050. Recorded listing of releases and texts 202/632-0002.

August 14, 1992

Below 1 GHz LEO Negotiated Rulemaking Committee

Agency: Federal Communications Commission
Action: Notice of public meetings.
Summary: In accordance with the Federal Advisory Committee Act, Public Law 92-463, as amended, this notice advises interested persons of the fourth meeting of the Below 1 GHz LEO Negotiated Rulemaking Committee ("Committee"), which will be held at the Federal Communications Commission in Washington, D.C.
Date: September 1, 1992 at 9:30 a.m.
Addresses: Federal Communications Commission, Rm. 856, 1919 M Street, N.W., Washington, D.C. 20554.
For additional information contact: Thomas S. Tycz, Deputy Chief, Domestic Facilities Division, Federal Communications Commission, at (202) 634-1860.
Supplementary Information: The agenda for the fourth meeting of the Committee will be to approve the minutes of the prior meeting, identify any new record information, report on the progress of the informal working group, discuss any reports of that group, and to update the agenda for the Committee meeting scheduled for September 8.

A more detailed agenda for this meeting will be available at the Federal Communications Commission in CC Docket 92-76 following the Committee's meeting on August 24, 1992.

Members of the general public may attend this meeting. The Federal Communications Commission will attempt to accommodate as many people as possible. However, admittance will be limited to the seating available. There will be no public oral participation, but the public may submit written comments to Thomas S. Tycz, the Committee's designated Federal Officer, before the meeting.

- FCC -

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Section 2.106 of the	)	ET Docket 91-280
Commission's Rules to Allocate	)	
Spectrum to the Fixed-Satellite	)	RM-7334
Service and the Mobile-Satellite	)	RM-7399
Service for Low-Earth Orbit Satellites	)	RM-7612

COMMENTS OF LEOSAT CORPORATION IN RESPONSE TO THE NOTICE OF PROPOSED RULEMAKING

EXECUTIVE SUMMARY

LEOSAT Corporation applauds the Commission's fundamental proposals to allocate VHF spectrum to low earth orbit technology on a multiple entry basis. If all applicants before the Commission are licensed on an equal basis, the Commission's fundamental proposals are certain to result in the delivery of many new and valuable services to the American public. Leosat appends hereto **Draft Licensing Regulations** to enable VHF LEO satellite licensing on a multiple entry basis. An appended **Electromagnetic Compatibility Analysis** provides detailed technical support.

In its Comments, Leosat briefly recites the background of its involvement in this Proceeding as the leading proponent of open skies policies, smart car (intelligent vehicle highway systems) markets, and low-cost VHF MSS systems. Leosat has identified 8 unique questions asked by the Commission which it addresses with detailed technical support. As previously stated, Leosat will amend its application to comply with whatever rules the Commission ultimately adopts in order to be licensed.

Fundamentally, the Commission asks (1) can LEO systems share with existing VHF band users, and if so, via what technical means, and (2) can LEO systems share an allocated band among themselves, and if so, via what technical means. Leosat believes the answer to both questions is affirmative, and that spread spectrum techniques plus reasonable operating constraints are the best solutions.

BACKGROUND

LEOSAT Corporation ("Leosat") is one of the four applicants for the service to be implemented pursuant to the above-captioned frequency allocation proposal. Leosat developed a unique smart car mobile satellite services focus for its application, as well as the most cost-effective proposal of any of the other applicants. Compared to the $200-$300 million system price tags of Orbcomm and Starsys, Leosat has submitted proof that it will implement its system at a cost of approximately $1 million per satellite using $400,000 Ariane ASAP launches and $700,000 Defense Systems Inc. Microsats. Clearly, the public is likely to see low earth orbit mobile satellite service much sooner via affordable Leosat than via the difficult to finance projects of Orbcomm and Starsys. This was recognized in the Comments -- Leosat received a large number of substantive comments in support of its system design.

In its Application to the Commission, Leosat emphasized that it would use off-the-shelf technology (which it showed was available by submitted brochures of its satellites), and that it would comply with whatever technical modulation rules were adopted by the FCC (in accordance with the Commission's Public Notice). Leosat also emphasized that it believed that an "open skies", multiple entry based regulatory regime was the only one which made policy sense, in light of the Commission's past experience with satellite services, and hence Leosat looked forward to competing with other VHF LEO

service suppliers to serve the public interest. Because of Leosat's much lower system costs, and its evident marketing capability, the other VHF LEO applicants have petitioned to deny Leosat's application on various fallacious bases as a means of blocking out a vigorous competitor.

[Leosat's system costs are so much lower than the others because Orbcomm was created by its parent Orbital Sciences as a way to sell launches and satellites at a huge profit, and Starsys is used by the French aerospace establishment as a way to develop a small satellite industry. Leosat appears to be the only applicant whose only interest is to provide VHF MSS services to the mass automobile market at the lowest possible price, including bundled into new car purchase prices.]

Leosat has subsequently demonstrated that there was no validity to the bases upon which its application was opposed. Indeed, numerous substantial companies and organizations urged the Commission to approve Leosat's application expeditiously. For example, contrary to the "smear" tactics used by its competitors, Leosat showed that it submitted its application on time, that its application was as compliant with Appendix B filing procedures as those of the others, and that its proposed multiple entry approach was clearly workable. [For example, Orbcomm violated the 2-satellite only rule, and admittedly lacked the financial qualifications to implement a $300 million satellite system].

Leosat believes that the record of anti-competitor filings in this proceeding emphasizes the all-important objective of allocating spectrum on a basis of open skies, multiple entry-based competition in VHF LEO services. Each of the applicants, and especially Orbcomm, have used various specious arguments to block out competition, when experience has shown that the marketplace is the best place to determine which systems should and should not exist. Companies can always trump up technical reasons why competition cannot work -- too little spectrum, too difficult to share, too small a market, etc. If any of these arguments are true, the financial and user marketplace will sort out the winners and losers. The most important task for the Commission is to allocate spectrum on a multiple entry basis, and to authorize all those applications currently before it on a level playing field.

Leosat applauds the Commission's fundamental decision in the Notice of Proposed Rulemaking to "provide for multiple operators of LEO systems." [Notice at para. 25]. Leosat agrees with the Commission that the spectrum it has proposed is adequate to support multiple entry, especially if CDMA spectrum sharing is required. Even without mandated modulation techniques, Leosat is confident that a LEO Technical Coordinating Committee made up of all licensees' engineers would successfully coordinate all of their systems -- especially if the alternative was a return to the Commission for a legally-imposed solution.

In its Comments, Leosat provides technical support for the various questions raised in the Notice of Proposed Rulemaking:

1. Can LEO services be met through the facilities of other existing services? Leosat believes they clearly cannot.

2. Can the design aspects of Leosat's System share the band with existing users in the 137-138 MHz band? Leosat's detailed technical analysis shows that it can.

3. Can the design aspects of Leosat's System share the band with existing users in the 148-149 MHz band? Leosat's detailed technical analysis shows that it can.

4. Can Leosat comply with proposed footnote US320? Leosat's detailed technical analysis shows that it can.

5. Can Leosat use the Transit band? Leosat can use the 149.9 MHz band but not the 399.9 MHz band.

6. What are the relevant advantages of CDMA v. FDMA? Leosat's Attachment A shows that four systems can readily co-exist via CDMA on an open skies, multiple entry basis.

7. Should a separate non-commercial LEO allocation be made? Leosat believes that VITA is much better off buying its services from commercial LEO operators, and that a non-commercial

LEO operator may lack the incentives for efficiency needed to serve the public interest.

8. Specifically, is multiple entry more possible with FDMA or CDMA? Leosat believes that CDMA is much more sensible for multiple entry.

VHF LEO SERVICES DON'T HAVE SUBSTITUTES

At paragraph 14 of the Notice of Proposed Rulemaking (NPRM), the Commission asks whether the proposed LEO services could be met through the facilities of other existing services. Leosat is certain that the answer is no. The key features of LEO services are:

- User terminal cost under $100;
- Can interface with existing car antenna;
- Works everywhere;
- Capacity to handle millions of intermittent non-voice users.

Leosat knows of no other technology with these key features. There are terrestrial technologies with user terminal costs under $100, but they cannot work everywhere -- only within base station coverage areas. There are satellite systems that work everywhere, but their user terminals cost far in excess of $100 -- AMSC terminals are over $3000 and even Iridium terminals are projected to cost over $1000. VHF LEO services are unique.

FEASIBILITY OF SHARING 137-138 MHZ

Leosat believes that sharing of the 137-138 MHz band is especially feasible using CDMA techniques. The current user population is relatively light, consisting mostly of space ops and metsats. Leosat will employ a spread-spectrum signal to utilize up to 1 MHz of bandwidth. By averaging out any interfering signals -- an inherent capability of spread spectrum systems -- the Leosat system will significantly increase its probability of successful packet transmission despite the presence of metsat and space ops users.

A worst case situation involves a high power emission from a metsat downlink channel generating interfering noise power of minus191.2 dBW/Hz (assuming nearly 9 dBW output and LEO orbital parameters). This implies that the interferor has degraded the Leosat user terminal's margin by 9 dB, from the nominal 14 dB. This may result in blocking of Leosat transmissions only at the periphery of a Leosat coverage area, when margin becomes problematic, and then only when the metsat is clearly in view. Since Leosat and the metsats will occupy quite different orbits, interference problems will be further minimized.

FEASIBILITY OF SHARING 148-149.9 MHZ

The 148-149.9 MHz band is heavily utilized by fixed and mobile services. Signals are generally narrowband, and may be high power,

especially from base stations. The high power signals are therefore at well-known frequencies. Notch filters will be able to excise the worst high power interferors, while the inherent interference rejection capability of spread spectrum will provide immunity from the general level of background interference.

A worst case interference situation (for non high-power base stations) occurs when the Leosat satellite is transiting a high terrestrial interference area, such as the United States, and might be expected to be within line of sight of as many as 321 simultaneous terrestrial transmitters, each with an average power output of 30 watts. [Ref. United States of America Draft Recommendation, CCIR Study Group 8D/35-E, December 1991]. The Leosat System will operate with a 1.0 MHz bandwidth, and will hence receive a total noise power of some -176.0 dBw/Hz in the worst case, which is insufficient to diminish Leosat operating margins. Hence, interfering signals which are generally spread across the spectrum and hence appear as noise do not inhibit Leosat system performance.

A separate case involves high power base stations. In this case, Leosat could implement either fixed or automatically settable notch filters ("search and destroy" filters) to block out those unusual interferors. The satellites could compute the FFT as fast as the interfering signals are received in the on-board processor, and clip the sharp peaks. About ten such filters can be employed with negligible impact on signal processing.

In summary, Leosat is confident that it can operate in a 1 MHz segment of the 148-149.9 MHz band without imposing any operating constraint upon existing users of those frequencies. Background interference is processed out via the coding gain of Leosat's CDMA implementation, while high power narrow band base station signals are excised with notch filters.

With regard to interference from Leosat mobile users into terrestrial base station receivers, geographic user density considerations limit the likelihood of this interference case. However, the low power density of CDMA transmissions makes electromagnetic compatibility more clearly possible.

FEASIBILITY OF USING TRANSIT BANDS

Leosat supports the use of the Transit bands for LEO services. However, with regard to Leosat, we would use only the 149.9-150.05 MHz segment to avoid requiring a separate 400 MHz antenna. Leosat is willing to spread its signal over any 1 MHz segment from 148-150.05 MHz.

Leosat disagrees with the need to wait to access the Transit bands until 1996. Virtually every Transit user has or shortly will transition to GPS, which is more accurate, more available and increasingly less costly. Simply because Transit spacecraft may continue operating until 1996 is not a reason to delay access to the

Transit band. As a practical matter, in the geopositioning community, Transit is already history.

ADVANTAGES OF FDMA AND CDMA

Any comparison of the benefits and drawbacks of CDMA and FDMA is difficult due to the risk of making "apples and oranges" type assumptions. Leosat filed for a VHF LEO system, relying on the Commission's Public Notice that applicants would have an opportunity to conform to whichever technical rules the Commission ultimately adopted. Leosat filed information generally compatible with an FDMA implementation, although with bandwidths compatible with CDMA, and subsequent research by Leosat has indicated that CDMA has important electromagnetic compatibility benefits, as explained in Attachment A. Basically, Leosat took the same approach as the Commission's Advance Publication of LEOTELCOM (hybrid approach).

Leosat believes that if the Commission authorized all four applicants subject to modulation coordination within a Technical Coordinating Committee, CDMA would emerge as the favorite because it permits each system to be implemented with minimal inter-system coordination, and provides the easiest way of dealing with interference. For example, in the big LEO proceeding, nearly all of the applicants have proposed CDMA to facilitate multiple entry.

The Canadian Government commissioned a comparative study of FDMA and CDMA for VHF LEO which is appended hereto as Attachment C. While the Canadian Study is cautious to negative on the general subject of sharing at all, it is clear in its recommendation that CDMA is preferable to FDMA under all electromagnetic compatibility link assessments. For example the Canadian Study concludes that:

- dynamic channel assignment for FDMA may not be feasible for widely varying power levels, and hence the Orbcomm-type system may cause widescale interference to ground receivers; (p.12)

- "the CDMA realization would appear to offer superior performance over the FDMA/FM realization" considering EMC aspects of low transmit powers, message lengths, duty cycles, and traffic densities. (p. 13).

In summary, it appears to Leosat that the industry consensus is that CDMA is preferable to FDMA when implementing a system in an interference limited environment such as 137/149 MHz. Leosat would be willing to build its system pursuant to CDMA modulation.

NON-COMMERCIAL VHF LEO POLICY

The Commission has asked whether or not it is wise to create a special non-commercial VHF LEO policy or allocation. In Leosat's view, this would not be a good precedent.

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NON-COMMERCIAL VHF LEO POLICY

The Commission has asked whether or not it is wise to create a special non-commercial VHF LEO policy or allocation. In Leosat's view, this would not be a good precedent.

Commercial organizations have profit-driven incentives to make efficient use of the scarce frequencies and capital facilities. However, non-commercial organizations are more mission-oriented -- for example, VITA could use up scarce VHF spectrum for just a handful of users but justify such use in grant requests to non-profit funding agencies.

VITA has not shown why it could not implement its service via rented circuits from Orbcomm, Starsys or Leosat, and a rulemaking petition or waiver request to the Commission requesting authority to conduct international service via such systems. VITA has not shown an intent or plan to serve large, mass markets such as Leosat has undertaken. This implies that VITA will not make as efficient use of the scarce VHF LEO band.

Even if the Commission does authorize VITA, it would not make sense to create a specific non-profit VHF LEO allocation. The trend in spectrum management is in the opposite direction -- away from spectrum reserves and toward general, multi-purpose, multi-user allocations.

MULTIPLE ENTRY TECHNICAL FACTORS

As shown in the Attachment A, CDMA techniques will permit four VHF LEO systems, each with a full satellite constellation, to share one megahertz in each direction, and each still enjoy a

capacity to serve millions of intermittent users. Clearly, therefore, multiple entry is possible.

Each additional CDMA VHF LEO system appears as code noise to the other systems. This code noise is simply averaged out together with other sources of noise (e.g. terrestrial radio interference), and the additional processing gain of a unique set of CDMA codes still permits acceptable links to be maintained.

It is also possible to implement multiple access via FDMA techniques, but much more coordination is necessary, thus leaving each system operator with less flexibility. Also, with FDMA one loses many of the interference-immunity benefits of CDMA.

Finally, it is possible to implement multiple entry with a combination of CDMA and FDMA. For example, Starsys and Leosat could be authorized to share the 137-138 MHz and 149.05-150.05 MHz bands on a CDMA basis, while Orbcomm implements its system in the 148-149.05 and 400 MHz bands on an FDMA basis.

Leosat wishes to reiterate that it is willing to implement its VHF LEO technology under whichever rules the Commission ultimately adopts, and that it believes the main point is to ensure open skies for all systems. However, after over a year of careful study, and discussions with Leosat partners throughout the world, it does appear that CDMA has many advantages over FDMA both for multiple entry and for interference immunity.

CONCLUSION

Leosat commends the Commission's foresight in proposing to allocate spectrum for VHF LEO on a multiple entry basis. Leosat believes that since VHF LEO is not a "safety-of-life service", substantial operating constraints can be accepted by the VHF LEO service, such as acceptance of interference. These problems can be mitigated by launching more satellites, by using more clever signal processing techniques, and by appropriate product/service marketing. What is most important is to not cause interference to existing users of these bands, and to ensure flexible multiple entry. These goals seem to be best implemented via CDMA.

Leosat recognizes that the Commission may not want to mandate detailed technical standards for VHF LEO. In this case, Leosat urges the Commission to authorize all applicants on the condition that they coordinate their system parameters within a Technical Coordinating Committee, subject to proposed U.S. footnote 320 and report back to the Commission at regular intervals.

Respectfully Submitted,

LEOSAT CORPORATION
Joseph Roldan, President
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December 24, 1991

I Joseph Roldan, do hereby certify that today, December 24, 1991, I

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